<u>What is claimed:</u>

1.   A method for digitizing a data signal, comprising the steps of:

receiving an input analog data signal;

splitting the received input analog data signal into a plurality of split signals;

mixing at least one of said split signals with a predetermined periodic function with a predetermined frequency;

digitizing said split signals; and

combining said digitized split signals mathematically to form a single output data stream that is a substantially correct representation of the original input signal.

2.   The method of claim 1, wherein the input analog data signal is split by a 50 Ohm splitter.

3.   The method of claim 1, wherein said predetermined periodic function is a low-distortion sinusoid.

4.   The method of claim 1, further comprising the step of band limiting each of the split signals to a corresponding one of a plurality of predetermined band ranges before mixing.

5.   The method of claim 4, wherein a frequency of said periodic function is at a low side of said band of said at least one split signal that is mixed.

6.   The method of claim 4, wherein a frequency of said periodic function is at a high side of said band of said at least one split signal that is mixed.

7.   The method of claim 1, further comprising the step of passing the mixed signal through an image reject filter, having a second predetermined frequency.

8.   The method of claim 7, wherein said image reject filter comprises an intrinsic bandwidth of a digitized channel used for digitizing said mixed signal.

9.   The method of claim 1, wherein said mixing is accomplished by a sampling action of a digitizer used for digitizing said at least one split signal.

10.   A method for digitizing a data signal, comprising the steps of:

receiving an input analog data signal;

splitting the received input analog data signal into a low frequency split signal and a high frequency split signal;

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mixing at least one of said low frequency and said high frequency split signals

with a predetermined periodic function with a predetermined frequency;

digitizing said split signals;

band limiting each of the split signals to a predetermined band range;

5   upsampling each digitized signal to a predetermined sample rate;

mixing said at least one of said low frequency and said high frequency split

signals with a predetermined periodic function with said predetermined frequency,

resulting in two images of the split signal;

passing said at least one of said high frequency and said low frequency split

10   signals through an image reject filter, having a second predetermined frequency, to

remove an unwanted one of the two images; and

combining said digitized split signals mathematically to form a single output data

stream that is a substantially correct representation of the original input signal.

11.   The method of claim 10, further comprising the step of passing at least one of said

15   low frequency and high frequency split signals through a band limiting filter;

12.   The method of claim 10, further comprising the step of equalizing the low

frequency and the high frequency signals separately to compensate for non-ideal

magnitude and phase characteristics of front-end and digitizing systems for each channel.

13.   The method of claim 10, wherein the input analog data signal is split by a 50 Ohm

20   splitter.

14.   The method of claim 10, wherein said predetermined periodic functions are low-

distortion sinusoids.

15.   An apparatus for digitizing a data signal, comprising:

an input for receiving an input analog data signal;

25   a splitter for splitting the received input analog data signal into a plurality of split

signals;

a mixer for mixing at least one of said split signals with a predetermined periodic

function with a predetermined frequency;

a digitizer for digitizing said split signals; and

a combining unit for combining said digitized split signals mathematically to form a single output data stream that is a substantially correct representation of the original input signal.

16.   The apparatus of claim 15, wherein said splitter is a 50 Ohm splitter.

17.   The apparatus of claim 15, wherein said predetermined periodic function is a low-distortion sinusoid.

18.   The apparatus of claim 15, further comprising a band limiter for band limiting each of the split signals to a corresponding one of a plurality of predetermined band ranges before mixing.

19.   The apparatus of claim 18, wherein a frequency of said periodic function is at a low side of said band of said at least one split signal that is mixed.

20.   The apparatus of claim 18, wherein a frequency of said periodic function is at a high side of said band of said at least one split signal that is mixed.

21.   The apparatus of claim 15, further comprising an image reject filter having a second predetermined frequency for receiving and passing the mixed signal.

22.   The apparatus of claim 21, wherein said image reject filter comprises an intrinsic bandwidth of a digitized channel used for digitizing said mixed signal.

23.   The apparatus of claim 15, wherein said mixing is accomplished by a sampling action of a digitizer used for digitizing said at least one split signal.

24.   An apparatus for digitizing a data signal, comprising:

an input for receiving an input analog data signal;

a splitter for splitting the received input analog data signal into a low frequency split signal and a high frequency split signal;

a first mixer for mixing at least one of said high frequency and said low frequency split signals with a predetermined periodic function with a predetermined frequency;

a digitizer for digitizing said split signals;

a band limiter for band limiting each of the split signals to a predetermined band range;

an upsampler for upsampling each digitized signal to a predetermined sample rate;

a second mixer for mixing said at least one of said high frequency and said low frequency split signals with a predetermined periodic function with said predetermined frequency, resulting in two images of the split signal;

an image reject filter, having a second predetermined frequency for receiving and passing said at least one of said high frequency and said low frequency split signals to remove an unwanted one of the two images; and

a combining unit for combining said digitized split signals mathematically to form a single output data stream that is a substantially correct representation of the original input signal.

25.   The apparatus of claim 24, further comprising a band limiting filter for receiving and passing at least one of said high frequency and low frequency split signals.

26.   The apparatus of claim 24, further comprising an equalizer for equalizing the high frequency and the low frequency signals separately to compensate for non-ideal magnitude and phase characteristics of front-end and digitizing systems for each channel.

27.   The apparatus of claim 24, wherein said splitter is a 50 Ohm splitter.

28.   The apparatus of claim 24, wherein said predetermined periodic functions are low-distortion sinusoids.

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